

Proposal 4

Proposal to the
CEBAF
Program Advisory Committee

The Study of Excited Baryons at High Momentum Transfer with the CLAS

The N^* Group

-in the CLAS Collaboration-

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Abstract: It is proposed to measure the properties of excited nucleons at high Q^2 by means of exclusive single meson production. The motivation is to investigate short range phenomena in the transition from the non-perturbative QCD regime, where theoretical descriptions have used non-relativistic, and relativized mean field models, to those involving perturbative QCD (pQCD). Initial measurements will be carried out at $Q^2 \sim 3 - 4 \text{ GeV}^2/c^2$ at an incident electron energy of 4 GeV, utilizing the initial detection capabilities of the CLAS spectrometer. Later measurements will be extended to higher Q^2 as electron detection acceptance and/or the electron beam energy increases. Among the specific issues we wish to investigate are whether the form-factors of the larger amplitude transitions approach the Q^2 dependence predicted by pQCD calculations, whether there is significant longitudinal strength in the region of the Roper resonance, and whether the anomalous behavior of the $S_{11}(1535)$ form factor continues at high Q^2 .